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BUCHU SEED GERMINATION

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Abstract

The possible causes of poor seed germination of Buchu (*Agathosma betulina* Pillans, *A. crenulata* Pillans) were investigated. It appears that harvesting of immature seed is the major contributory factor. More uniform germination can be obtained by pre-sowing exposure of the seeds to dry heat (20—40 min. at 80°C).

Uittreksel

BOEGOESAAD ONTKIEMING.
Die moontlike oorsake van swak saadontkieming van Boegoe (*Agathosma betulina* Pillans, *A. crenulata* Pillans) is ondersoek. Dit blyk dat die oes van onryp saad die hoof bydraende faktor is. Meer uniforme ontkieming kan verkry word deur die saad voor saai aan droe hitte (20—40 min by 80° C) bloot te stel.

Introduction

One of the major problems in establishing buchu (*Agathosma betulina* Pillans, *A. crenulata* Pillans) plantations is poor and protracted seed germination. As most seeds are eaten by mice and birds it is customary for growers to harvest the seed-capsules before they are completely mature and dehisce, scattering the seed. Normally growers either sow the seed in seedbeds for subsequent transplanting or alternatively the seeds are planted *in situ* on previously prepared land.

The results of some experiments which were conducted to determine the cause of poor seed germination are reported below.

Methods and Results

Seed collection

To determine whether poor seed germination is due to harvesting of unripe seeds, shoots of buchu plants located in plantations of three growers were enclosed in cheesecloth bags at the time the first capsules started to shed their seeds. The bags were left on the plants until all capsules had dehisced, and the seeds then collected. Seed samples harvested by the growers in the normal way served as controls.

Viability of representative seed samples was determined by the following methods: 1. Placement of seeds in deionised water followed by stirring and

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determining the percentage of seeds which sink to the bottom. This is a fairly reliable method which in previous tests proved to be approximately 95 per cent accurate. 2. Removal of seed coat to determine whether the embryo is fully developed. 3. Exposure of embryos (seed coat removed) to a one per cent solution of 2, 3, 5-triphenyl tetrazolium chloride for 24 hours. Development of a red triphenyl formazone colour in the embryonic tissues indicates viability. 4. Germination of intact seeds on moist filter paper in Petri dishes using four replications of 25 seeds per dish. Seeds were allowed to germinate for three months in a growth cabinet at a 10 hour day temperature of 18°C and 14 hour night temperature of 10°C. These day-lengths and temperatures were chosen to simulate winter conditions.

The results of one of the viability tests employed in which the germination of seed samples harvested in the normal way by three growers are compared with those collected in the manner described above, are given in Table 1. Essentially similar results were obtained using methods one to three.

Table 1

Effect of harvest method on germination of buchu seed

	Origin of seed	
	Seed collected by grower % Germination	*Seed collected in cheesecloth bags % Germination*
Producer 1	40	81
,, 2	7	68
,, 3	10	85

Seed germination

In an effort to stimulate earlier and more uniform seed germination several recognised methods of treating seeds were tested on a sample of freshly harvested, viable seed as determined by the water submersion method. The following treatments were tested: 1. Moist stratification at 9°C for 1, 2 and 3 months respectively. 2. Immersion in concentrated sulphuric acid for 30 minutes, one and two hours, respectively. 3. Immersion in solutions of sodium bisulphite (2 per cent), sodium hydroxide (2 per cent in 50 per cent ethanol) and hydrogen peroxide (20 per cent), respectively for 24 hours. 4. Leaching in running water for three and six days, respectively. 5. Exposure to dry heat for different periods and at two temperatures. The same germination procedure as given above was used, each treatment comprising 100 seeds (25 per Petri dish) including a no-treatment control.

None of the treatments tested except dry heat, affected germination and the latter results are given in Table 2.

TABLE 2

Germination of buchu seed after three months following various heat treatments

Treatment	*Percentage germination*
Dry heat for 1 day at 50°C	55 ± 12
,, ,, ,, 2 days ,, ,,	50 ± 15
,, ,, ,, 3 ,, ,, ,,	25 ± 10
,, ,, ,, 5 min ,, 80°C	65 ± 16
,, ,, ,, 10 ,, ,, ,,	55 ± 13
,, ,, ,, 20 ,, ,, ,,	80 ± 13
,, ,, ,, 40 ,, ,, ,,	75 ± 9
Control – no treatment	40 ± 12

DISCUSSION

Poor germination of seed obtained by growers is probably due to the collection of unripe seeds containing abortive embryos. The buchu plant normally flowers over an extended period and seed capsules in different stages of development are to be found on the same plant when maturation commences. Unfortunately no conspicuous change in colour of the capsule occurs immediately before the seeds are shed. Consequently, in order to obtain a larger percentage of viable seeds attempts should be made to harvest at frequent intervals after the first capsules start to shed their seeds. Alternatively shoots or the whole plant can be enclosed in cheesecloth bags until most of the seed have been shed.

Normally buchu seeds commence germination two months and more after being sown. As can be seen from Table 2, heat treatment of the seed, particularly that of exposure to a temperature of 80°C for a period of 20 to 40 minutes, effectively stimulated germination. However, the results are somewhat misleading as the experiment was terminated after three months. Subsequent germination of seeds may still have continued even up to six months and longer, as is often encountered in seedbeds of producers. The important effect of heat treatment therefore is to stimulate germination over a shorter period with the advantage that more uniform and stronger seedlings are obtained at the time of transplanting.

C.T.P. LTD.